REMARKS

The Applicants thank the Examiner for the thorough consideration given the present application. Claims 1-39 are pending. Claims 1-10 and 12-35 are amended and 36-39 are added. Claims 1, 11, 15, 19, 23, 26, 29, 32, 36, and 37 are independent. The Examiner is respectfully requested to reconsider the rejections in view of the amendments and remarks set forth herein.

Claim for Priority

It is gratefully acknowledge that the Examiner has recognized the Applicants' claim for foreign priority.

Objection to the Drawings

The Examiner has objected to the drawings because reference numeral 106 is not mentioned in the specification.

In order to overcome this objection, the specification is amended herein to address the deficiency pointed out by the Examiner. Accordingly, reconsideration and withdrawal of this objection are respectfully requested.

Substitute Specification

In accordance with MPEP §608.01(q), the Applicants herewith submit a substitute specification in the above-identified application. Also included is a marked-up copy of the original specification which shows the portions of the original specification which are being added and deleted. The Applicants respectfully submit that the substitute specification includes no new matter and

that the substitute specification includes the same changes as are indicated in the marked-up copy of the original specification showing additions and deletions.

Because the number of amendments which are being made to the original specification would render it difficult to consider the case, or to arrange the papers for printing or copying, the Applicants are voluntarily submitting this substitute specification. Accordingly, the Applicants respectfully request that the substitute specification be entered into the application.

Abstract of the Disclosure

The Abstract is revised herein to place it in a form more typical of U.S. patent practice.

Rejections Under 35 U.S.C. §102(e) and 35 U.S.C. §103(a)

Claims 1-4, 8-9, 11 and 13 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,470,378 to Tracton et al.

Claims 15-26 and 29-30 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,263,503 to Margulis.

Claims 5-7, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tracton et al. in view of Margulis.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tracton in view of U.S. Patent No. 6,246,430 to Peters et al.

Claims 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Margulis in view of Tracton et al.

These rejections are respectfully traversed.

Amendments to Independent Claims 1, 11, 15, 19, 23, 26, 29, and 32

While not conceding the appropriateness of the Examiner's rejection, but merely to advance prosecution of the present application, independent claims 1, 15, 19, and 29 are amended herein to recite combinations of elements directed to a broadcast service system wherein an encoding rate of the video signals and a transmission rate of the mobile communication network are varied in accordance with a voice telephone call quantity information.

In addition, independent 23 and 26 are amended herein to recite combinations of method steps directed to a broadcasting service method, including wherein an encoding rate of the video signals and a transmission rate of the mobile communication network are varied in accordance with a voice telephone call quantity information.

Further, independent claims 11 and 32 are amended herein to recite combinations of elements directed to a mobile communications terminal, including wherein the mobile communication terminal receives and decodes the broadcast signal at a rate which varies in accordance with a voice telephone call quantity information and a transmission rate of a mobile communication network.

Support for varying an encoding rate of the video signals and a transmission rate of the mobile communication network in accordance with a voice telephone call quantity information, as set forth in independent claims 1, 11, 15, 19, 23, 26, 29, and 32 of the present application can be found in the

specification, for example on page 10, lines 5-16 of the original specification (corresponds to paragraphs [0052-0053] of the Substitute Specification.

The Applicants respectfully submits that the combinations of elements and method steps set forth in independent claims 1, 11, 15, 19, 23, 26, 29, and 32 are not disclosed or made obvious by the prior art of record, including Tracton et al., Margulis, and Peters et al.

In contrast to the presently claimed invention, the Tracton et al. document (column 5, lines 58-61) is directed to scaling of the original source according to client capabilities, network speed, and other abilities/restrictions indicated in a profile, but fails to teach or suggest, *inter alia*, varying an encoding rate of the video signals and a transmission rate of the mobile communication network in accordance with a voice telephone call quantity information, as set forth in the independent claims of the present invention.

Likewise, the Margulis document (column 5, lines 14-16) merely discloses a wireless base station 156, but fails to teach or suggest, *inter alia*, controlling an encoding rate of the video signals and a transmission rate of the mobile communication network in accordance with a voice telephone call quantity information, as set forth in the independent claims of the present invention.

In addition, the Peter et al. document, which is combined with Tracton et al. to reject dependent claim 10, fails to make up for the deficiencies of Tracton et al.

Thus no combination of Tracton et al., Margulis, and Peters et al. can teach or suggest the combinations of elements and method steps set forth in independents claims 1, 11, 15, 19, 23, 26, 29, and 32 of the present invention, for the reasons explained above.

Added Claims 36-39

Added dependent claims 36-39 depend from independent claims 1, 11 and 19.

Support for the subject matter in claims 36-39 can be found in the specification, for example, on page 10, lines 5-16 of the original specification. See also Fig. 1.

In view of the amendments and arguments described above, independent claims 1, 11, 15, 19, 23, 26, 29 and 32 are in condition for allowance. Further, dependent claims 2-10, 12-14, 16-18, 20-22, 21-22, 27-28, 30-31 and 33-39 are in condition for allowance due to their dependency from allowable independent claims, or for the additional novel limitations set forth therein.

Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. §102(e) and §103(a) are respectfully requested.

<u>CONCLUSION</u>

Since the remaining patents cited by the Examiner have not been utilized to reject claims, but merely to show the state of the art, no comment need be made with respect thereto.
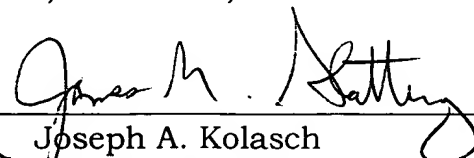
All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. It is believed that a full and complete response has been made to the outstanding Office Action, and that the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, he is invited to telephone Carl T. Thomsen (Reg. No. 50,786) at (703) 205-8000.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,

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Attachment: Substitute Specification
        Revised Abstract

BROADCASTING SERVICE SYSTEM USING MOBILE COMMUNICATION TERMINAL

BACKGROUND OF THE INVENTION

1.   Field of the Invention

[0001]   The present invention relates to a system which is capable of receiving a broadcasting signal and a telephone signal, and watching and listening it to them on a mobile communication terminal, and in particular to a system which is capable of receiving a video signal and an audio signal, decoding it them, and displaying the decoded signals on the monitor of the mobile communication terminal.

2.   Description of the Prior Art

[0002]   Organic combination or link between the conventional personal mobile communication system and digital television system for maximizing advantages of the both systems are is not accomplished. In addition, in the digital television system, various additional information with high quality images are only provided to digital television sets. In other words, the conventional personal mobile communication system such as a cellular phone can not cannot transmit and receive video, audio and character information.

SUMMARY OF THE INVENTION

[0003]   It is an object of the present invention to provide a broadcasting service system using a mobile communication terminal which is capable of watching television broadcasting on a mobile communication subscriber terminal, when a mobile communication network subscriber wants to watch broadcasting~~.~~ ~~The~~ The system is capable of recognizing and answering the subscriber request, providing broadcasting information, and controlling digital and analog broadcasting signals to transmit on the subscriber terminal through the mobile communication network.

[0004]   ~~The other~~ Another object of the present invention is to provide a subscriber terminal, when analog and digital moving picture broadcasting signals are converted according to signal standard of the mobile communication network, which is capable of receiving and restoring the converted analog and digital moving picture information, and outputting images and sounds.

[0005]   ~~The another~~ Another object of the present invention is to provide a broadcasting signal selecting ~~mean~~ unit which is capable of selecting broadcasting information, receiving and restoring the selected broadcasting signal in order to watch digital and analog television broadcasting.

[0006]   ~~The another~~ Another object of the present invention is to provide a broadcasting service method using a mobile communication terminal which is capable of converting digital and analog broadcasting signals in real time according to a transmission standard of the mobile communication network, and

transmitting the converted broadcasting signals through the mobile communication network, watching the transmitted television signals on the subscriber terminal.

[0007]   To achieve the objects, the broadcasting service system using the mobile communication terminal includes a converting mean unit which receives a video and audio signal provided from the moving picture information and converts the video and audio signal, and a transmitting mean unit which transmits the converted video and audio signal to a subscriber through a certain transmission line of the mobile communication network.

[0008]   To achieve the objects of the present invention, in order to receive broadcasting signals, the mobile communication terminal includes a receiving mean unit which receives the digital video and audio data, a decoding mean unit which decodes the received digital video and audio data, and an outputting mean unit which outputs the decoded video and audio signal.

[0009]   To achieve the objects of the present invention, the mobile communication subscriber terminal includes a broadcasting reception mean unit which receives the broadcasting signal as a moving picture information, a communication process mean unit which receives, restores a call signal provided to a subscriber and outputs it through the mobile communication network, and coding-outputs a transmitting call signal through the mobile communication network, a decoding mean unit which restores the received broadcasting signal by the broadcasting reception mean unit, an output mean unit which outputs the broadcasting signal restored by the decoding mean unit to a terminal to be

watched, and a selecting mean unit which selects the broadcasting signal reception mode and mobile communication call mode.

[0010]   To achieve the objects of the present invention, the broadcasting service method using the mobile communication terminal includes a converting process which converts the broadcasting signal having the digital video and audio data into a data agreed with the signal and transmission standard of the mobile communication network, and a transmission process which transmits the converted digital video and audio data to the subscriber through a certain transmission channel of the mobile communication network.

[0011]   Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]   The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings, which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

[0013]   Figure 1 is a schematic block diagram illustrating the structure of a broadcasting service system using a mobile communication terminal according to the preferred embodiment of the present invention.

[0014]   Figure 2 is a block diagram illustrating the broadcasting service system using the mobile communication terminal according to the preferred embodiment of the present invention.

[0015]   Figure 3 is a block diagram illustrating the operation of the format converter of the present invention.

[0016]   Figure 4 is a block diagram illustrating the operation of the EPG (Electronic Program Guide) converting processor of the present invention.

[0017]   Figure 5A is a block diagram illustrating the operation of the digital broadcasting service system of the present invention in relation to a video and audio information process and mobile communication network matching.

[0018]   Figure 5B is a block diagram illustrating the operation of the analog broadcasting system of the present invention in relation to a video and audio information process and mobile communication network matching.

[0019]   Figure 6 is a block diagram illustrating the operation of the transcoder of the present invention.

[0020]   Figure 7 is a block diagram illustrating the operation of the mobile communication terminal of the present invention.

[0021]   Figure 8 is a flow chart illustrating the control process of the

broadcasting service of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022]   Figure 1 is a schematic block diagram illustrating the structure of a broadcasting service system using a mobile communication terminal of the preferred embodiment of the present invention. As depicted in figure 1, a television broadcasting system 101 transmits a video and audio signal to a subscriber terminal 104 through a ~~satelite~~satellite network 102, a television broadcasting network 103 or a cable network (Cable). The subscriber terminal 104 receives the video and audio signal, and outputs an image and sound by decoding the video and audio signal.

[0023]   Herein, the television broadcasting system 101 ~~is~~ may be a moving picture and audio information broadcasting system, ~~it may be~~ an analog television broadcasting system, a digital television broadcasting system, or other moving picture information broadcasting system.

[0024]   The conventional analog broadcasting system includes a NTSC (National Television System Committee) broadcasting method, a PAL (Phase Alternation Line) broadcasting method, and a SECAM (~~Sequenctial~~Sequential Couleur Avec Memoire) broadcasting ~~method which~~method, which are commonly used.

[0025]   And the conventional digital broadcasting system includes a ATSC

(Advanced Television Systems Committee) method of America, a DVB (digital Video Broadcasting) method of Europe, and a digital broadcasting method of Japan. Herein, the ATSC method of America adopts a MPEG2 (Moving Picture Experts Group 2), Dolby AC3 and 8VSB, and the DVB method of Europe adopts a MPEG2 (Moving Picture Experts Group 2) and an OFDM (Orthogonal Frequency Division Multiplexing).

[0026]   As described above, in the digital television broadcasting system, the video and audio ~~signal~~ signals are provided as a compressed digital data (bit stream). Herein, the compressed digital data has a protocol in relation to reception and transmission~~,~~. ~~Accordingly~~ Accordingly the digital broadcasting information agreed with the protocol includes the video and audio data and EPG (Electronic Program Guide) and additional data, ~~and~~ which are processed together.

[0027]   In ~~figure~~ Figure 1 of the present invention, processing of the digital video signal compressed as the MPEG2 (Moving Picture Experts Group 2) is described.

[0028]   When the television broadcasting system 101 is the digital television broadcasting system, the video information provided to the digital television is a compressed-encoded information as the MPEG2 (Moving Picture Experts Group 2) standard over communication path 106~~,~~. ~~Accordingly~~ Accordingly a format converter 105 for converting the compressed-encoded information into ~~a~~ an MPEG4 (Moving Picture Experts Group 4) ~~agreed with~~ used as an image standard of the mobile communication network is included.

[0029]   Meanwhile, when the television broadcasting system 101 is the analog

television broadcasting system, the television broadcasting system 101 (moving picture provider) or the format converter 105 can have a converting ~~mean~~ unit which converts the provided video information into a digital signal having a certain format ~~agreed with~~ used in the mobile communication network transmission standard.

[0030]   The format converter 105 ~~is inputted~~ receives the MPEG2 (Moving Picture Experts Group 2) ~~videotex~~videotext provided from the television broadcasting system 101, and format-converts the MPEG2 ~~videotex~~videotext into the MPEG4 (Moving Picture Experts Group 4) ~~videotex~~videotext ~~agreed with~~ used in the mobile communication network.

[0031]   The format converter 105 will be described with reference to the accompanying ~~figure~~ Figure 5B.

[0032]   The format converter 105 can convert the MPEG2 (Moving Picture Experts Group 2) ~~videotex~~videotext into H.26L, H.263, or H.26X format. As far as the converted format agrees with the mobile communication network, there is no limitation in the format.

[0033]   The format converter 105 exchanges the information needed in the format conversion with the television broadcasting system 101 through a transmission line 107.

[0034]   The format converter 105 will be described in detail.

[0035]   For example, the bit rate of the digital television adapts high speed broadcasting band, such as 19.236 Mbps of HD level, or 6 Mbps of SD level.

[0036]   However, the data transmission rate of IMT-2000 is maximum 144 Kbps or 2 Mbps (in case of a Pico Cell) according to a Cell. ~~Likewise~~ Likewise, on the mobile communication network which can process maximum 2 Mbps two-way signal, transmitting the digital television signal directly to a cellular phone or PCS is impossible due to the distinctive character of the mobile communication network.

[0037]   Therefore the format converting process which converts the MPEG2 digital television signal into the signal ~~agreed with~~ used in the mobile communication network such as the MPEG4 (Moving Picture Experts Group 4) is required. ~~the~~ The format converter 105 performs transcoding of the video and audio data, formats and converts the EPG (Electronic Program Guide) and additional information of the digital television information to make the signals agree with the mobile communication network.

[0038]   The converted digital video and audio data information ~~are~~ is provided to a MTSO (System Controller and Switch) 108 through a transmission line 109. The MTSO 108 provides a signal for answering a request from a subscriber to the format converter 105 through a transmission line 110, allots the digital video and audio information to a certain channel of the mobile communication network, and transmits the digital information as a RF frequency to a subscriber terminal 112 through a base station.

[0039]   As described above, the video and audio ~~signal~~ signals of the television broadcasting system 101 are converted into the ~~signal agreed with~~ signals used in the mobile communication network, and are transmitted to the subscriber terminal

112. Accordingly it is possible to watch the television broadcasting on the subscriber terminal (cellular phone, PCS, IMT-2000 terminal).

[0040] Figure 2 is a block diagram illustrating the operation of the broadcasting service system using the mobile communication terminal of the present invention~. It It depicts the preferred embodiment of the system including the format converter 105 and the server (MTSO) 108 and the base station 111.

[0041] When a moving picture information is the digital television broadcasting system, a television reception unit 201 receives the additional information including the digital video, audio information and the EPG (Electronic Program Guide) data agreed with used in the digital television broadcasting system, and transmits the MPEG2 (Moving Picture Experts Group_2) signal to a transcoder 202. The television reception unit 201 abstracts the EPG (electronic Electronic Program Guide) data and transmits it to a EPG converting unit 203, and abstracts the additional data and transmits it to a additional data converting unit 204.

[0042] The transcoder 202 converts the inputted MPEG2 (Moving Picture Experts Group_2) digital video and audio data into the MPEG4 (Moving Picture Experts Group_4) digital video and audio data, and transmits it to a channel multiplexer 205.

[0043] As Since the digital video data transmission medium media are diversified not the same, and the characters of each medium media are different, accordingly there is a need to make ensure that the bit rate and converting method of the digital image agree with the medium media character during the

transmission.

[0044]   In particular, the system of the present invention provides the digital television broadcasting signal to the mobile communication terminal such as the cellular phone or PCS through the mobile communication network, ~~accordingly transcoding for converting the compressed bit is adapted in order to transmit~~ by converting the digital video data to a format compatible with the medium having a different bandwidth.

[0045]   The EPG converting unit 203 decodes the inputted MPEG2 EPG data, and converts it into the MPEG4 EPG data.

[0046]   The additional data converting unit 204 decodes the inputted MPEG2 additional data into the MPEG4 additional data.

[0047]   The EPG and additional data can be converted into the data ~~agreed with~~ used in a wireless ~~internet~~Internet network.

[0048]   The channel multiplexer 205 puts the MPEG4 video and audio data provided from the transcoder 202 on a certain allotted channel, and at the same time puts the EPG data outputted from the EPG converting unit 203 and the additional data outputted from the additional data converting unit 204 on a certain allotted channel.

[0049]   The MPEG4 (Moving Picture Experts Group 4) digital television video, audio, EPG (~~electronic~~ Electronic Program Guide) and additional information converted in accordance with the character of the mobile communication network by passing through the above process are transmitted to the subscriber mobile

communication terminal through a RF (Radio Frequency) reception unit 206.

[0050]   Herein, the The RF reception unit 206 is corresponding corresponds to the server (MTSO) 108, or to the base station of the mobile communication network.

[0051]   In SD level of the MPEG2 (Moving Picture Experts Group_2), 6_Mbps band is required,; in HD level, about approximately a 19_Mbps band is required,; and when the MPEG2 is converted into the MPEG4 (Moving Picture Experts Group_4), a moving picture can be transmitted as at about a 64_Kbps bit rate. Herein, the moving picture can be transmitted by being allotted a part of the IMT-2000 band as a television broadcasting band.

[0052]   Meanwhile, when moving picture information is transmitted as a packet in order to transmit the moving picture information through an exclusive broadcasting broadcast channel (transmission line), in consideration of the character of the mobile communication network, a voice band is changeable on one base station in accordance with a subscriber telephone call quantity,. at At this time television broadcasting information should not be taken all band take all the bandwidth., accordingly Accordingly a band bandwidth controlling method for a changeable band bandwidth allotment is required.

[0053]   When a BW-video means a moving picture (including sound) band for the digital television broadcasting broadcast, and a BW-audio means audio band for voice communication of the mobile communication terminal, the size of the audio band changes from 0 to a maximum BW-audio, in accordance with the voice

telephone call quantity.

[0054]   Accordingly, the channel multiplexer 205 provides voice telephone call quantity information to a transmission rate control unit 207 in accordance with the voice telephone call quantity, the transmission rate control unit 207 controls encoding rate of the MPEG4 (Moving Picture Experts Group 4) of the transcoder 202 by using the provided information from the channel multiplexer 205.

[0055]   In addition, as described above, the digital television broadcasting can service not only the video and audio information, but also additional information, the additional information is provided to a subscriber through the additional information converting unit 204 and channel multiplexer 205.

[0056]   Figure 3 is a block diagram illustrating the preferred embodiment of the format converter of the present invention~.   ~It shows the construction of the format converting system which comprises a transcoder, a EPG (Electronic Program Guide) data converting unit, and a data service converting processor.

[0057]   Herein, a format converter 302 for converting the signal inputted from the television broadcasting system 101, 301 into the signal agreeable to used in a mobile communication network 303 is shown.   The format converter 302 includes an A/V stream transcoder 304 which receives an A/V stream from the television broadcasting system and converts it into the format agreed with the mobile communication network, an EPG converting processor 305 which receives an EPG (Electronic Program Guide) stream from the television broadcasting system and converts it into the format agreed with the mobile communication network, and

a data service converting processor 306 which receives a data stream from the television broadcasting system and converts it into the format agreed with the mobile communication network.

[0058]   First, the A/V stream transcoder 304 converts the MPEG2 (Moving Picture Experts Group_2) digital video (including audio) information into the MPEG4 (Moving Picture Experts Group_4) or H.26L, H.263, H.26X format, and provides it to the mobile communication network 303. Herein, the converted digital video data can be provided to the subscriber in accordance with a subscriber request (A/V RQ) of the mobile communication network 303.

[0059]   The EPG converting processor 305 converts the MPEG2 EPG stream inputted from the television broadcasting system into the signal agreed with used in the mobile communication network.

[0060]   Figure 4 is a block diagram illustrating the embodiment of the EPG converting processor of the present invention. As depicted in figure Figure 4, the EPG converting processor 305 inputs the EPG information inputted from a PSIP (Program Stream Internet Protocol) table, performs format-decoding, abstracts needed information such as transmission rate of program or bit by filtering the format-decoded information, format-converts the abstracted information, and constructs it in order to satisfy a wireless data protocol.

[0061]   Herein, format-conversion in WAP (wireless Wireless Application Protocol), PSIP (Program Stream Internet Protocol) text is converted into HDML (Handheld device Device Mark-up Language) or TTML (Tagged Text Mark-up

Language). In format-conversion in wireless data protocol, the PSIP is converted into HDTP (Handheld Device Transport Protocol) or ITTP (Intelligent Terminal Transfer Protocol).

[0062]   ~~As depicted in figure 4, it illustrates~~ Figure 4 shows an EPG analysis unit 401, an EPG answering control unit 402, a schedule data base 403, and a protocol converter 404.

[0063]   First, the EPG analysis unit 401 ~~analysis~~ analyzes the inputted EPG guide stream according to a encoded format, abstracts information in relation to channel and schedule of broadcasting programs, and stores the abstracted result on the schedule data base 403.

[0064]   The schedule data base 403 records and stores the inputted information from the EPG analysis unit 401 on a memory, and checks and outputs a certain information of the data base in accordance with a request from the EPG answering control unit 402.

[0065]   The EPG answering control unit 402 operates in accordance with the EPG answering request (EPG RQ) from the subscriber through the server MTSO 303, searches the information corresponding to the subscriber request on the schedule data base 403, and transmits it to the protocol converter 404.

[0066]   The protocol converter 404 converts the data inputted from the EPG answering control unit 402 into a format ~~agreed with~~ used in the MTSO 303, and outputs it to the MTSO 303 for answering the subscriber request and ~~being watched by~~ displaying the data to the subscriber on the mobile communication

terminal.

[0067]   Meanwhile, the service converting processor 306 is inputted the additional information (data stream) from the television broadcasting system 301, converts it into a format ~~agreed with~~ used in the mobile communication network, and provides the information corresponding to the subscriber request (Data RQ).

[0068]   In other words, the data service converting processor 306 performs the bit rate and protocol conversion process which converts the digital television broadcasting contents into the contents format ~~agreed with~~ used in the mobile communication network.

[0069]   For example, the service information of the digital television broadcasting system is decoded by a MHEG-5 engine or an XHTML browser, and the decoded information is converted into the signal and format ~~agreed with~~ used in the mobile communication network.

[0070]   Herein, in the WAP conversion, Carousel/IP Datagram is converted into HDTP (High ~~definition transport~~ Definition Transport Protocol), and MHEG/XHTML (Multimedia and Hypermedia Expert Group/XHyper Text Markup Language) is converted into HDML (Handheld Device Mark-up Language).

[0071]   Figure 5A is a block diagram illustrating the operation of the preferred embodiment of the digital broadcasting service system in relation to processing of video, audio and additional information, and matching the processed information with the mobile communication network of the present invention.

[0072]   As depicted in ~~figure 5~~ Figure 5A, the digital broadcasting system using

the mobile communication comprises a digital signal processing unit 501, a medium storing unit 502, a data processing/converting unit 503, and a transcoder/transmission unit 504.

[0073]   ~~Its~~ Next, the operation of the digital broadcasting system shown in Figure 5A will be described in detail.

[0074]   The digital signal processing unit 501 is a information program transmission unit which provides broadcasting program to the mobile communication network by receiving a 19.2 Mbps HD level and a 6 Mbps SD level multi-channel digital television signal.

[0075]   The digital signal processing unit 501 selects the inputted digital television signal on a tuner 505, demodulates the selected signal on a demodulating unit 506, abstracts information in accordance with each broadcasting channel on a de-multiplexer 507, and then reproduces and outputs the video and audio signal as the original digital television broadcasting signal by a MPEG decoder 508.

[0076]   Herein, the MPEG TP de-multiplexer 507 abstracts the data, regardless of the format, for providing PSI (Program System Information), guide information and additional information.

[0077]   The medium storing unit 502 includes a MPEG recorder 502A, a MPEG file input/output unit 502B, and a file filter 502C. ~~It~~ It is a file system to make a disk scheduling and disk data block size agree with the MPEG stream for storing a digital television broadcasting signal maximum 30 Mbps level MPEG2 stream in

real time. The medium storing unit 502 stores a stream such as the MPEG4 itself, and services it to the mobile communication network.

[0078]   Herein, a striping method is used to store the MPEG2 transmission stream transmitted from the digital television broadcasting signal reception unit as a consecutive block unit. The transcoder 513 may support GOP unit, I-Frame Value on the file system in order to ~~operate effectively a~~ effectively operate Bit Rate Drop, Macro Block, and Intra/Inter compensation.

[0079]   A data processing/converting unit 512 includes an EPG decoder 509, a data decoder 510, a presentation engine unit 511, and a protocol converting unit 512.

[0080]   As described above, the data processing/converting unit 512 abstracts and converts the EPG and additional information received from the digital television broadcasting ~~for~~ being used by a mobile communication terminal user.

[0081]   The EPG decoder 509 abstracts and decodes the EPG data inputted from the digital signal processing unit 501.

[0082]   The presentation engine unit 511 contents-format-converts the decoded EPG data, and outputs it to the protocol converting unit 512.

[0083]   Herein, as described above, the format conversion in the WAP (Wireless Application Protocol), PSIP(Program Stream Internet Protocol) text is converted into HDML(Handheld Device Mark-up Language) or TTML(Tagged Text Mark-up Language)~~.~~ On the other hand, ~~and~~ in the wireless data protocol, PSIP (Program Stream Internet Protocol) is converted into HDTP Handheld Device Transport

Protocol), ITTP (Intelligent terminal Transfer Protocol).

[0084]   The data decoder 510 abstracts and decodes the additional service information from the inputted data.

[0085]   In addition, the presentation engine unit 511 contents-format-converts the decoded additional service information, and outputs it to the protocol converting unit 512.

[0086]   Herein, in wireless internet WAP converting, Carousel/IP Datagram agrees with HDTP, and MHEG/XHTML agrees with HDML.

[0087]   The protocol converting unit 512 converts the additional information, including the format-converted EPG data, into a protocol agreed with used in the mobile communication network, and outputs it.

[0088]   The transcoder 513 converts the digital video (including audio) broadcasting signal inputted from the digital signal processing unit 501 into the signal agreed with used in the mobile communication network. For example, it can convert the MPEG2 into the MPEG4, and provides the converted digital video and audio data to a wireless stream processing unit 517 in accordance with transmission control of a transmission rate control unit 516.

[0089]   Figure 5B is a block diagram illustrating the analog broadcasting service system in relation with processing of video, audio and additional information and matching with the mobile communication network. As depicted in figure Figure 5B, the analog television broadcasting system using the mobile communication comprises an analog signal processing unit 518, the medium storing unit 502, the

data processing/converting unit 503, and the transcoder/transmission unit 504.

[0090]   Next, the analog broadcasting system shown in Figure 5B It will be described in detail.

[0091]   The medium storing unit 502, data processing/converting unit 503 and transcoder/transmission unit 504 are same in figure 5A, thus description of the parts are is abridged.

[0092]   The analog signal processing unit 518 includes an analog broadcasting signal reception unit 519, an analog digital converting unit 520, a MPEG4 encoder 521, and a VBI abstraction unit 522. Herein, the analog signal processing unit 518 is information program transmission unit for receiving the analog television signal and providing the broadcasting program to the mobile communication network.

[0093]   In addition, the analog signal processing unit 518 includes an analog broadcasting reception unit 519, which receives and restores the analog television signal, an analog digital converting unit 520, which converts the restored analog broadcasting signal (including moving picture and audio information) into a digital data, a MPEG4 encoder 521, which converts the converted digital data into MPEG4 (Moving Picture Experts Group_4) format and outputs it to the transcoder/transmission unit 504, and the VBI abstraction unit 522, which abstracts the EPG (Electronic Program Guide) data and additional data on the VBI section, and provides it separately to the EPG decoder 509 and the additional data decoder 510.

[0094]   The Description description of the operation of the above construction

analog system shown in Figure 5B is the same with description as the digital system shown in Figure 5A of figure 5A, and thus is abridged.

[0095]   Accordingly, when the moving picture information is the an analog television broadcasting signal, a broadcasting service using the mobile communication is possible.

[0096]   Figure 6 is a block diagram illustrating the operation of the transcoder of the present invention for converting the MPEG2 (Moving Picture Experts Group 2) into the MPEG4 (Moving Picture Experts Group 4).

[0097]   As depicted in figure Figure 6, when H.26L, H.263, H.26X are the digital video and audio data formats agreed with used in the mobile communication network, a construction of a circuit and an algorithm for converting these formats is possible.

[0098]   As described above, in order to transmit a television broadcasting signal by using a wireless communication network in real time, the television broadcasting signal has to agree with the character of the wireless communication network. In other words, transcoding has to be performed between the different systems. Herein, in order to prevent video (image) deterioration due to the transcoding, a certain pertinent transcoding method can be selected between wide-spread from different transcoding methods.

[0099]   In addition, without not passing through the transcoding process, transmitting digital television broadcasting information is possible by using the digital compressed algorithm algorithms such as MPEG4 (Moving Picture Expert

Group_4) or H.263.

[0100]   The circuit of ~~figure~~ Figure 6 includes a decoder unit 601 which is inputted the MPEG2 (Moving Picture Experts Group_2) bit stream and decodes it, and encoder unit 602 which encodes the decoded restoration digital video data into the MPEG4 (Moving Picture Experts Group_4) bit stream~~,~~. Next, its operation will be described in detail.

[0101]   First, the decoded video data on a variable signal decoder 603 of the decoder unit 601 is converted into reverse quantization and IDCT (Inverse Discrete Cosine Transform) through a reverse quantization unit 604 and IDCT Inverse Discrete Cosine Transform) unit 605. The converted reverse quantization and IDCT are decoded perfectly by passing through motion compensation process of the output device including an adder 606, a memory 607 and a motion compensation unit 608.

[0102]   The encoding unit 602 encodes the restored digital video data according to quantization step which is different with the above decoding quantization step (in the present invention, the MPEG2 (Moving Picture Experts Group_2) is converted into the MPEG4 (Moving Picture Experts Group_4), quantization step of the encoder is lager than quantization step of the decoder), the digital compressed video data coated with the MPEG4 is outputted.

[0103]   In order to compress and process the digital video data, the encoder unit 602 discrete-cosine-converts the difference between inputted video and restored video outputted through an adder 609, a DCT (Discrete Cosine

Transform) unit 610 outputs it, a quantization unit 611 makes the signal inputted from the DCT unit 610 quantized, and a variable signal encoder 612 converts the quantized signal into the MPEG4 bit stream and outputs it~~,~~. The ~~the~~ outputted data from the quantization unit 611 is restored through the reverse quantization unit 613 and IDCT (Inverse Discrete Cosine Transform) unit 614, the balance between the restored video data and the inputted video data of the adder 609 is calculated by passing through the motion compensation process of the adder 615, memory 616 and a motion compensation unit 617, and, as a result, the calculated balance is discrete-cosine-transformed and quantized.

[0104]   Accordingly, the data transcoded ~~data~~ by the above process is inputted to a transmission rate control unit 516 in ~~figure 5A, 5B~~ Figures 5A and 5B, is controlled as transmission rate agreeable to the mobile communication network, and is inputted to a wireless network stream processing unit 517.

[0105]   Meanwhile, a wireless network data protocol processing unit 515 designates a data protocol ~~agreeable to~~ compatible with the mobile communication network, such as a HDTP (High Definition Transport Protocol) or a ITTP (Intelligent Terminal Transfer Protocol) on the WAP (Wireless Application Protocol) ~~to,~~ and with the EPG (Electronic Program Guide) data, and additional data outputted from the protocol converting unit 512 of the data processing/converting unit 503.

[0106]   When the user of mobile communication terminal ~~requires~~ initiates a search for a certain broadcasting schedule by sending a key word such as an program title or an actor name, the wireless network data protocol processing unit

515 supports the data base of the presentation engine unit 511 to ~~search~~ easily search for the program schedule or the program concept.

[0107]   The medium synchronization control unit 514 reconstructs the transcoded video and audio data by the transcoder 513 and the converted data by the data processing/converting unit 503, and provides the data which does not require synchronization directly to the wireless stream processing unit 517.

[0108]   In other words, the medium synchronization control unit 514 resynchronizes the lost synchronization information of the synchronized broadcasting data with the closest video and audio data through the transcoder 513.

[0109]   As described above, the reconstructed digital video, audio and additional information ~~agreed to~~ used in the mobile communication network are inputted to the wireless stream processing unit 517.

[0110]   The wireless stream processing unit 517 transmits the moving picture and data to pertinent channel of the mobile communication network in real time, and performs channel ~~allot~~ allocation or ~~cancel~~ cancelation in relation to the digital television signal transmission for answering request of the subscriber.

[0111]   Figure 7 is a block diagram of the preferred embodiment of the mobile communication terminal 112 of the present invention~~.~~ It ~~it~~ describes the construction of the mobile communication terminal receiving the television signal transmitted from the mobile communication network.

[0112]   -Next, the ~~Its~~ construction and operation of the mobile

communications terminal 112 will be described in detail.

[0113]   First, a RF reception and transmission unit 702 receives and transmits the base station communication signal received from an antenna 701 and the signal for voice telephone call communication, and receives the television broadcasting signal transmitted to pertinent call channel.

[0114]   In the voice telephone call communication, a voice telephone call is initiated from a "calling" party to a "called" party using a mobile communication terminal 112.   The "called" party terminal receives the voice signal of the "calling" party on its RF transmission and reception unit 702.   Then, a voice encoding and decoding unit 703 of the "called" terminal 112 duplicates the received voice signal, ~~of the opponent caller received from the RF reception and transmission unit 702,~~ and outputs it to a voice processing unit 706.

[0115]   The voice processing unit 706 outputs the duplicated voice signal to a speaker SP, encodes the duplicated voice signal through a microphone MIC of the subscriber terminal, and transmits it to the RF reception and transmission unit 702.

[0116]   A video encoding and decoding unit 704 performs a MPEG4 decoder function. In the preferred embodiment of the present invention, the MPEG decoder is included in order to reproduce the transcoded MPEG4 (Moving Picture Experts Group 4) video data, which is transmitted through the mobile communication network, ~~but.~~   On the other hand, a H.263 codec may be included in the IMT-2000, in accordance with circumstance of the mobile communication

network.

[0117] Accordingly, in order to process moving picture information ~~as a~~ in the particular format ~~agreed with~~ used in the mobile communication network, various ~~encoding~~ standard ~~codec~~ codecs can be included.

[0118] In the television broadcasting reception mode, the video encoding and decoding unit 704 receives the MPEG4 (Moving Picture Experts Group_4) digital video signal inputted from the RF reception and transmission unit 702, restores it, and outputs the restored television video signal to a monitor 708 through a video processing unit 707.

[0119] In the mobile communication system having two-way monitor communication function, a camera 705 transmits a signal having the photographed subscriber image by passing through the video processing unit 707, the video encoding and decoding unit 704, and the RF reception and transmission unit 702.

[0120] A processor 709 having the voice telephone call mode and television reception mode controls the each construction unit in accordance with the mode, reads information on a memory unit 710, and stores information on the memory unit 710.

[0121] A key input unit 711 has designated keys for the television reception with a key input function for telephone calls.

[0122] Figure 7 is a block diagram illustrating the operation of the mobile communication terminal of the present invention~~,~~. When ~~when~~ the television broadcasting signal is converted into the signal ~~agreed with~~ used in the mobile

communication network, the mobile communication terminal receives it, restores it

into video and audio, and outputs it.

[0123]   However, as described above, when the RF reception and

transmission unit 702 includes a TV tuner, although the television signal is not

converted into a signal ~~agreed with~~ used in the signal transmission standard of the

mobile communication network, the mobile communication terminal of the present

invention can receive, restore, and output the analog or digital television

broadcasting signal~~, restores it and outputs it~~.

[0124]   Herein, in the subscriber mobile communication terminal which

receives the analog television broadcasting signal, the RF reception and

transmission unit 702 performs a tuner function which receives the analog

television broadcasting signal from the antenna 701 and selects it, the voice

processing unit 706 processes the voice signal of the selected channel

broadcasting signal of the RF reception and transmission unit (hereinafter referred

to tuner) 702, and the video processing unit 707 processes the video signal of

the selected channel broadcasting signal, and outputs it to the monitor 708 in order

to display.

[0125]   As described above, the subscriber mobile communication

terminal receiving the analog television broadcasting signal includes the antenna,

the tuner, the video and audio processing unit, in ~~figure 7, the~~ Figure 7.   However,

the video and audio encoding and decoding unit can be excluded. As for the

antenna, speaker, and monitor of the above construction, the antenna, speaker,

and monitor of the conventional cellular phone, PCS, and IMT-2000 terminal can be used.

[0126]   Meanwhile, in the subscriber mobile communication terminal, the RF reception and transmission unit (tuner) 702 receives the digital television broadcasting signal from the antenna 701 and selects it, the voice decoding unit 706 outputs the restored voice signal to the speaker SP, the video decoding unit 704 restores the video signal of the selected digital broadcasting signal, and the video processing unit 707 processes the restored video signal and outputs it to the monitor for displaying.

[0127]   As described above, the subscriber mobile communication terminal which includes a decoding mean unit which decodes the digital video and audio signal,—the antenna, speaker and monitor of the conventional PCS, cellular phone and IMT-2000 terminal, can be used as it is.

[0128]   Figure 8 is a flow chart illustrating the control operation of the broadcasting service of the present invention,. It-it shows a certain process for the receiving television signal signals between the terminal of figure Figure 7 and the broadcasting service system using the mobile communication of the present invention.

[0129]   In figure Figure 7 and figure Figure 8, operations will be described. The EPG data is transmitted to the subscriber for answering the subscriber request, the format-converted signal based on the EPG data is transmitted to the subscriber in accordance with the subscriber select program through the allotted

channel.

[0130]   At the same time, a bill payment authorization is demanded to of the subscriber, it is assumed thus ensuring that the subscriber has the right to watch the digital television broadcasting. It is also assumed a mobile communication company has a designated telephone number to handle subscriber requests and also performs to perform a key word certifying certification process for confirming the subscriber.

[0131]   First, when the mobile communication terminal subscriber wants to receive the digital television broadcasting through the subscribed mobile communication network, the subscriber sets up the TV reception mode by using the key input unit 711, and then connects to the designated telephone number of the mobile communication company.

[0132]   After the connection completion, the subscriber is confirmed whether the confirms that he is a certified subscriber having the right for receiving to receive the digital television broadcasting by inputting the pass word.

[0133]   When the subscriber is certified, access is granted, and the pertinent channel for watching moving picture is allotted.

[0134]   After that, the server MTSO requires the EPG data to the format converter.

[0135]   As an answer for the EPG data request, the format converter provides the EPG data packet to the server MTSO. The server MTSO transmits the EPG data packet to the subscriber through the pertinent channel.

[0136]   Herein, the EPG data packet can have the format ~~agreed with~~ used in the wireless internet network.

[0137]   The EPG data packet received on the antenna 701 is decoded on the video encoding and decoding unit 704 through the video processing unit 707, and the decoded result shows on the monitor 708 through the video processing unit 707. The subscriber answers it by searching the EPG data, and selects a channel.

[0138]   In order to ~~make possible the~~ provide a subscriber search capability, a web browser ~~mean~~ is provided on the terminal (processor) for searching the EPG and additional information.

[0139]   The channel select information is inputted to the processor 709 through the key input unit 711, the processor 709 coding-controls the pertinent signal and transmits it to the server through the RF reception and transmission unit 702 and antenna 701.

[0140]   The server MTSO requires the video and audio data corresponding to the selected channel by the subscriber to the format converter, the format converter outputs the video and audio data, and transmits it to the subscriber through the mobile communication network.

[0141]   In order to watch the television broadcasting by using the mobile communication network, the transmitted television broadcasting signal is ~~provided~~ sent to the video encoding and decoding unit 704 of the terminal 112 through the antenna 701 and RF reception unit 702. As described above, the video encoding

and decoding unit 704 performs the MPEG4 decoder function, and accordingly decodes, outputs the video and audio to the monitor 708 and speaker SP through the each processing unit 707, 706.

[0142]   Meanwhile, after the subscriber certification, the server can perform payment demand by using the subscriber certification key word, such as an ID.

[0143]   Herein, the television broadcasting signal transmission to the certain channel (changeable channel) is opened and ~~continued~~ continues between the server and subscriber ~~is~~ as described~~,~~. However, ~~but~~ as described above, it is also possible to perform the television ~~system~~ broadcasting using the mobile communication of the present invention by allotting a certain channel for the television broadcasting.

[0144]   As described above in detail, the present invention is capable of ~~watching~~ transmitting moving picture information by using the mobile communication network, ~~watching~~ displaying the television ~~broadcasting by using the~~ on a subscriber's mobile communication terminal, transmitting the EPG data ~~for~~ in ~~answering~~ answer to a ~~the subscriber~~ subscriber's request, and providing the selected ~~broadcasting~~ broadcast program from the data to the subscriber in ~~a~~ real time.

[0145]   In addition, the subscriber can choose the television ~~broadcasting~~ broadcast, and watch the selected broadcast by using ~~the~~ a mobile communication terminal, such as ~~the~~ a cellular phone, PCS, and IMT2000.

[0146]   The invention being thus described, it will be obvious that the same may be varied in many ways.   Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.